

Abstract of the Disclosure

FUEL INJECTOR WITH AUXILIARY VALVE

A fuel injector includes an auxiliary valve member that can assist in raising a mean injection pressure, increase a nozzle valve opening pressure, and hasten the closure rate of a nozzle valve member over an equivalent fuel injector without the auxiliary valve. The auxiliary valve member is fluidly positioned between a needle control chamber and a high pressure space, which includes a fuel pressurization chamber within the fuel injector. The auxiliary valve member includes a closing hydraulic surface exposed to fluid pressure in the high pressure space. The plumbing and the auxiliary valve member allow high pressure fuel to act upon a closing hydraulic surface of the nozzle valve member to increase valve opening pressure and mean injection pressure. The needle control chamber may be vented or may be a closed volume when the auxiliary valve member is in its closed position. The invention is potentially applicable to any fuel injector, but finds the preferred application in cam actuated fuel injectors that include an electronically controlled spill valve.